

# Kelly Mahoney: Research activities/interests

## Front Range Colorado flood risk:

- Present-day climatology?
- Possible changes in a changing climate?
- Confidence in short-term (weather) predictions and long-term (climate) projections?
- More models/forecasts = better solutions?
- Stakeholder use of advances in research and computer modeling?
- Precipitation type (snow, hail, rain) and flood risk
- Why does a little rain sometimes flood and a lot of rain doesn't always? (coupled weather + hydrologic prediction)



(Reporter-Herald)

1976: Big Thompson Canyon/US 34

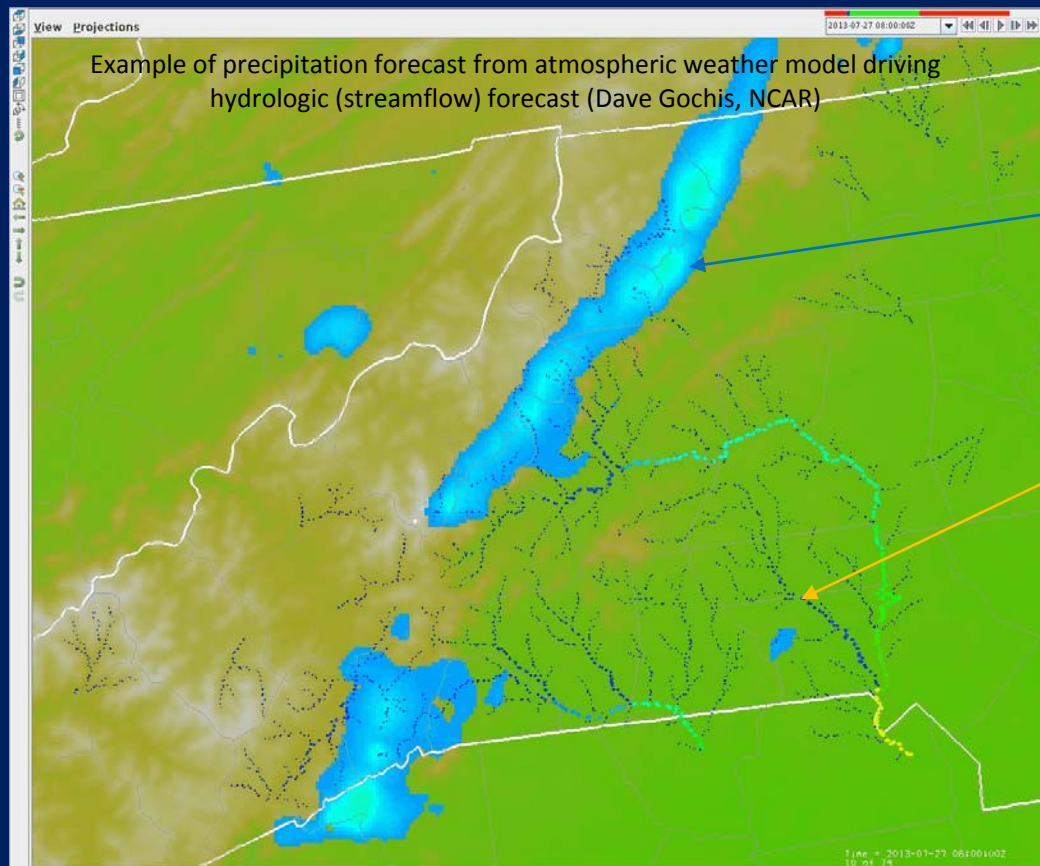


(Capt. D. Overstreet/Air National Guard)

2013: Big Thompson Canyon /US 34

# Coupled hydrometeorological modeling: weather and climate flood risk applications

- Flash floods: rain + surface hydrology
- Dam safety/risk assessment: potential streamflow/reservoir response; precipitation not enough
- Couple atmosphere + hydrology: evaluate more scenarios (vary rainfall + soil conditions + snowpack + global warming, ...)



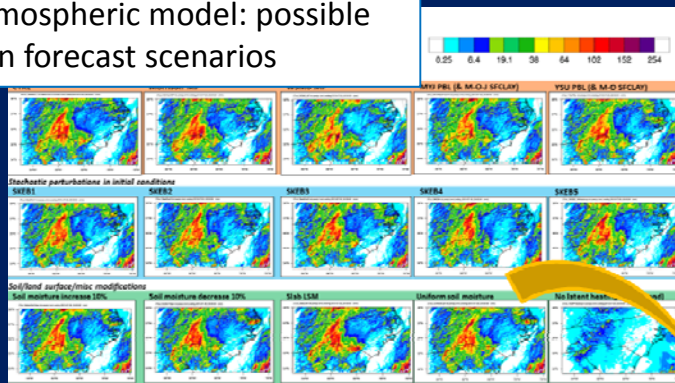
Atmospheric (“weather”) forecast model → rainfall forecast (shaded)

Hydrology (“water”) model → surface impacts, streamflow (colored lines)

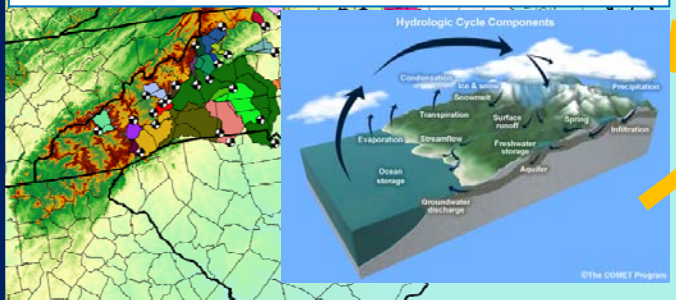
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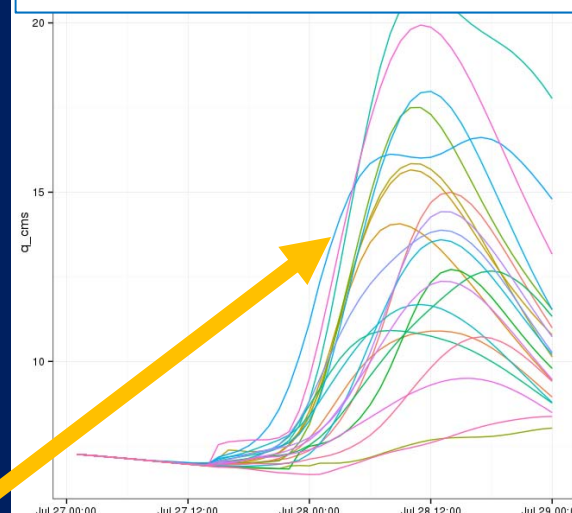
Atmospheric model: possible rain forecast scenarios



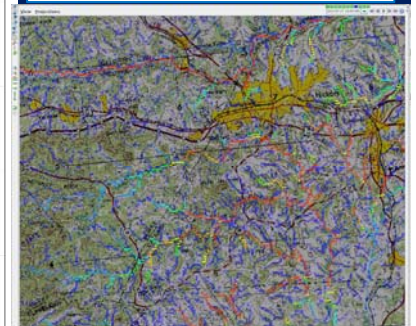
Hydrology model: What happens when water hits the ground?



Envelope of streamflow possibilities



Potential for surface inundation



More complete picture of possible impacts + uncertainty information...but display & communication more complex

